TOWARD WILDLIFE-FRIENDLY WIND POWER: A FOCUS ON THE GREAT LAKES BASIN

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PRIORITY RESEARCH AND INFORMATION NEEDS

Research tools

Post-construction research needs: [Manville]
- Tools for counting carcasses
- Understand scavenger removal and searcher efficiency biases

Need to test other indirect measures (e.g., radar passage rates, bat call rates) [Erickson]

In general, need a good way to count/monitor landbird migration. [Shieldcastle]

In general, need approaches to address cumulative impacts. [Erickson]

Need to evaluate methods to determine the best way to study pre-construction bat activity. [Arnett]

Animal patterns and behavior

In general, need more information about the height of flying animals, which is key to understanding risk. [Larkin]

Need more information about the actual process of migration for waterfowl. [Larkin]

Map known routes of waterbird and raptor migrations, waterfowl concentrations (migration and winter), shorebird stop-over sites, etc. [Russell]

Need further research on sensory channels in birds: [Beason]
1. Color tendencies: What do composite colors look like to them? What colors could be used to promote avoidance?
2. Patterns of movement: How well do birds recognize a moving blade? What speed of motion can they detect?

Need more information about: [Manville]
- Attraction of birds, bats and insects to turbines
- Role of turbulence
- Raptor vs. songbird attraction
- Efficacy of deterrents, mitigation, and other protective measures:
    - blade painting
    - feathering/short-term shutdowns
    - end-of-row pylons
    - reducing prey base
    - minimizing burrowing fossorial mammals
    - light minimization and type
    - sound deterrents (ultra- and infrasound)
    - removal of attractions
    - bird diverters, etc.

Need better information about how migrating birds are crossing Lake Erie. How many are crossing, and at what altitude? [Shieldcastle]

Need continued study of effects of lighting at communications towers (thus far, the two study periods yielded slightly different results). [Gehring]

Need full-season study of bat behavior so we know more about temporal variation. [Kunz]

[several bat research needs identified in Dr. Kunz's presentation]

In general, need to study temporal and spatial use of airspace by birds and bats. [Manville]

Need offshore waterbird and waterfowl data from ship-based line transects at various latitudes across all the Great Lakes and continental shelf waters. [Russell]

Pre-construction research

Review potential indirect impacts and effects – where possible – of proposed wind sites on nesting/breeding densities, loss of population vigor, habitat and site abandonment, increased isolation between patches, loss of refugia, attraction to modified habitats, effects on behavior (stress, interruption, and modification), displacement, and habitat unsuitability. [Manville]

Need to continue intensive pre-construction acoustical bat monitoring efforts. [Arnett]

Post-construction research

Need long-term studies on cumulative impact. [Tuttle]

Need more nesting studies in areas around existing projects. [Schladweiler]

Use Before-After Control Impact (BACI) design to determine significant changes in bird and bat behavior after installation. [Manville]

Need more properly designed fatality studies, especially in certain regions/habitats with limited/no data. Especially helpful to do this at

sites where radar data have been collected, to enable comparison and correlation. [Erickson]

Need to conduct more extensive post-construction studies for bat mortality, encompassing greater variety of habitat and topographic features, greater temporal coverage (full season or multi-year studies), and different blade conditions (speed? feathered?). Also need context so we know the proportional impact: how many total bats in the area? [Arnett]

Need to correlate pre- and post-construction bat studies so we know how well pre-construction study methods will predict actual impacts. [Arnett]

More post-construction radar studies—this will help correlate pre-construction predictions with post-construction results. [Erickson, Gautreaux]

Validate pre-construction assessments vs. post-construction impacts. [Manville]

Study levels of "take" vis-à-vis *Birds of Conservation Concern*. Study take from turbine strikes, additive vs. compensatory mortality, cumulative impacts. [Manville]

Need more data linking exposure to mortality, so don't have to wait until after construction to know what the impacts will be. [Gauthreaux]

Apply pre-construction data to risk and impact studies from post-construction monitoring and assessment. [Manville]

Mapping risk

Develop models based on collective data, which may allow us to categorize sites (low risk, high risk) without having to start from scratch at each location. [Barclay]

GIS is a good solution. We should rapidly map those areas where we know wind energy is inappropriate, as well as areas where we're pretty sure wind energy is fine (highly degraded land, e.g. row crop land). Should make the map available to wind industry to reduce some of their uncertainty.

Identify and map areas that should be protected from any significant lakebed alterations, due to the sensitivity of their biological, physical, archaeological, or other values, and designate them for legal protection. [Gannon]

Add information about migration and aerial habitat to any state natural heritage databases that are currently used in the siting or permitting process. In general, expand the notion of habitat to include airspace. [Czarnecki, Larkin]

Research infrastructure

Develop interstate coordinating body that can pull together research and set agenda for what to do next.

FWS can also serve as central data collection agency. [Ockene]

Would help to have centralized funding for study of cumulative impacts of wind power. [Kunz]

Consider a centralized fund, paid into by developers, as in the UK. [Ewert]

Consider funding industry study from a grant fund. Industry can then pay the fund back if a project is successful. [Rackstraw]

Need access to sites for post-construction monitoring of bird and bat fatalities. [Kunz, Tuttle]

Develop incentives (e.g., investor influence) to encourage companies to work with wildlife officials to study impacts and then find ways to minimize impacts during operation. [Tuttle]

Consider offering existing projects safe harbor protection in return for allowing us to do mortality studies. [Warman]

In general, research on wind power's effects on wildlife should be independent and transparent.

Develop widely applicable – including at local level – scientifically based approaches to assess risk and impacts from wind development on wildlife and their habitats. [Manville]

Need broader federal perspective. FWS is obvious candidate to bring this perspective, perhaps through guidelines. [Ockene]

Need to standardize pre- and post-construction studies so the results are meaningful. [Tuttle]

Need standard research and data collection protocols based on hypothesis testing (continent-wide).

Need to clearly identify problems we need to solve, what research to do, and how to make this research credible. [Tuttle]

In general, need better syntheses for existing information. [Erickson]

Suggest issuing an RFP for a pilot offshore wind farm (~6 turbines) in the Great Lakes with rigorous pre- to post-construction research and monitoring. There are too many unknowns to make yes/no or Best Management Practices decisions now. [Gannon] *Note: others say it's too late for test sites.*

Regulatory environment

Need a federal nexus for regulation. [several speakers]

Need to approach wind power with an attitude towards facilitating expansion of wind energy. [Warman]

Provide incentives to steer industry towards landscapes that are more appropriate. Big incentive = streamlined process for projects on low risk lands. [Warman]

Move toward adaptive management. Every site could have impacts—what if it's a migration fluke that happens once every 50 yrs? Maybe could install radar on site to trigger shut down. Or could predict conditions of greatest risk (weather, season, etc.). [Warman]

In general, determine Best Management Practices [Thorson]

Suggest a National review committee (federal agencies, NREL, DOI, DOE, tribes, etc.), State subcommittees (FWS, DNR, tribes, commerce, etc.), and Regional committees or contacts (by size of jurisdiction).

Develop review process, databases, and coordination of federal, state, and tribal staff.